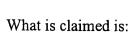
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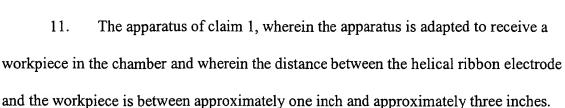
- An apparatus to perform semiconductor processing, comprising:
 a process chamber;
 a plasma generator for generating a plasma in the process chamber; and
 a helical ribbon electrode coupled to the output of the plasma generator.
- 2. The apparatus of claim 1, wherein the helical ribbon electrode is external to the process chamber.
- 3. The apparatus of claim 2, further comprising a dielectric wall position between the chamber and the helical ribbon electrode.
 - 4. The apparatus of claim 3, wherein the dielectric wall is a flat plate.
 - 5. The apparatus of claim 3, wherein the dielectric wall is concave.
 - 6. The apparatus of claim 3, wherein the dielectric wall is convex.
 - 7. The apparatus of claim 3, wherein the dielectric wall is a tube.
- 8. The apparatus of claim 7, wherein the dielectric wall projects through the center of the helical ribbon electrode.
- 9. The apparatus of claim 1, wherein the helical ribbon electrode is internal to the process chamber.
- 10. The apparatus of claim 1, wherein the apparatus is adapted to receive a workpiece in the chamber and wherein the distance between the helical ribbon electrode and the workpiece is less than five inches.

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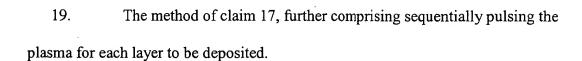


- 12. The apparatus of claim 1, wherein the plasma generator pulses the helicalribbon electrode to perform pulse processing.
 - 13. The apparatus of claim 1, further comprising a controller coupled to the control input of the plasma generator to control the generation of the plasma.
 - 14. The apparatus of claim 1, wherein the plasma generator is a radio frequency (RF) plasma generator.

15. The apparatus of claim 1, wherein the plasma generator is a solid state plasma generator without any moving parts and capable of short tuning response time.

- 16. The apparatus of claim 1, wherein the plasma generator is a solid state plasma generator employing frequency tuning to achieve output matching.
 - 17. A method to deposit a multi-layer semiconductor, comprising:
- (a) introducing a gas into a processing chamber; and
- (b) generating a pulse with a response time of less than one second; and
- (c) exciting the plasma in accordance with the pulse using a helical ribbon electrode.
- 18. The method of claim 17, further comprising purging the chamber.

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- 20. A multi-layer processing chamber, comprising:
- a gas source coupled to the chamber for introducing a processing gas into a reaction chamber having a sample disposed therein;
 - a solid state RF plasma source coupled to the chamber to excite the processing gas;

a helical ribbon electrode adapted to excite the plasma; and

a controller coupled to the solid state RF plasma source to pulse the solid state RF plasma source for each deposited layer.